

CHAPTER 1 -- INTRODUCTION TO THE MODULE

OBJECTIVES

After studying this chapter and reviewing its contents with your instructor, you will be able to:

1. Explain the purpose and content of the National Training Program for weights and measures officials.
2. Identify the purposes and objectives of this training module.
3. Identify the prerequisites of this module.
4. Describe, in general terms, the importance of regulation and examination of loading-rack meters at the State and local level in ensuring fair practices and equity in the marketplace.

THE NATIONAL TRAINING PROGRAM

As you are probably aware, enforcement of the system of weights and measures in the United States is a function of State and local jurisdictions, not the Federal Government. However, the National Institute of Standards and Technology (NIST, formerly the National Bureau of Standards) has a mandate to provide technical assistance and advice to promote measurement uniformity and traceability of standards. Historically, training has been a major part of NIST's approach to meeting this responsibility. In addition, the National Conference on Weights and Measures (NCWM) is supported by NIST as one means of fulfilling its statutory responsibility for cooperation with the States in securing uniformity in weights and measures laws and methods of inspection among the State and local jurisdictions.

In recent years technological advances, especially in the area of electronic devices, have increased the need for trained weights and measures officials. In response to this need, the National Conference on Weights and Measures, at its 67th Annual Meeting in 1982, adopted a plan to establish a national training program to:

- promote inspection and regulatory uniformity, and
- provide weights and measures officials with the knowledge and skills they need to deal with and benefit from changing technologies.

The program is divided into courses to meet the specific training needs of individuals or groups. The courses are designed primarily to provide structured and uniform training for new employees in the weights and measures field. However, the experienced official will benefit from refresher training and upgrading of skills.

A series of "functional courses" provides detailed instruction on specific functions of weights and measures officials, such as inspecting different types of equipment. Successful completion of these courses is a first step in obtaining NCWM certification as a qualified inspector of specific weighing and measuring devices.

Another series of courses, called "elective courses," covers background, theory, and policy on weights and measures related subjects. In some cases, the training provided by elective courses may prepare an official to study the functional courses. In other cases, the elective courses are intended as follow-ups to the functional courses.

The following courses cover topics that are related to specific aspects of this module, and may be especially useful either in preparation for your study of loading-rack meters or as supplements to the material covered in this course:

- Course 302 -- "Retail Motor-Fuel Dispensers and Consoles"

- Course 303 -- "Vehicle-Tank Meters"
- Course 305 -- "Liquefied Petroleum Gas Liquid-Measuring Devices"
- Course 102 -- "Introduction to NIST Handbook 44"
- Course 103 -- "Introduction to Electronic Weighing and Measuring Systems"

The NCWM Committee on Administration and Public Affairs (A & P) is responsible for coordinating the development of the training courses. The Committee contracts with professional training organizations to design and produce the materials.

COURSE OBJECTIVES

Maintenance of the productive economy and the standard of living enjoyed by Americans today depends upon the preservation of an open, competitive marketplace. Despite the growth of the "service sector" in our national economy, the vast majority of commercial transactions still involve material objects: commodities, many of which are bought and sold by weight or measure. The primary function of weights and measures laws and enforcement is to ensure the fairness and equity that are essential to the operation of this open marketplace.

One large class of commodities that has an enormous impact on our economy consists of petroleum products. Each year Americans consume hundreds of millions of gallons of petroleum products. We use them to heat our homes and fuel our automobiles, lawnmowers, and other machines that employ internal combustion engines. In many parts of the country, fossil fuels are used to generate the electricity that provides power for homes and industry. And petroleum and petroleum-based products are used as raw materials in the production of lubricants, paints, solvents, plastics, pharmaceuticals, agricultural and industrial chemicals -- a vast array of products that are essential to our contemporary way of life.

Most of us are at least aware of the devices that are commonly used to measure the petroleum products that we purchase directly -- gasoline pumps (used also for metering diesel fuel and, in some parts of the country, Liquefied Petroleum Gas [LPG] liquid motor fuel), fuel oil truck meters, natural gas meters in our homes, truck-mounted or stationary LPG meters. Many consumers also know that these devices are periodically tested and certified as accurate in some way by State or local agencies, although this function, and its importance, is largely taken for granted by the public.

However, few people consider that between the refinery and sale at the retail level virtually all petroleum products are bought and sold at least once (often more than once), that the basis for these wholesale transactions is measurement accomplished by weighing or measuring devices, and that the accuracy and fairness of these measurements can have a substantial impact on the price of petroleum products at the retail level.

If a manufacturer or distributor of a petroleum product suffers a loss as the result of improper measurement -- receiving less product than was paid for -- that loss, like any other inventory-related loss, will be passed on, in the form of higher prices, to the next consumer, all the way to the final buyer.

Of course, if individual measurement errors are relatively small and more or less random -- with errors in some transactions favoring the buyer, in others the seller -- competitive pressures could be expected to minimize their impact. But in a different situation, competitive forces could also work in a detrimental way. For example, if it became widely believed that some sellers were taking advantage of measurement errors for their own gain, there would be pressure on all sellers to follow suit. Given the enormous volume of sales of petroleum commodities, imagine the impact of an average measurement error for the entire industry of even one or two percent in favor of the seller!

That the use of accurate and fair weighing and measuring devices is in the interest not only of the consuming public, but of industry and the national economy in general, should be obvious. It should also be obvious that despite the interest of the petroleum industry as a whole in an equitable and secure marketplace, self-regulation and self-certification cannot alone provide the assurance necessary to maintain confidence and stability.

For this reason, States and local jurisdictions have adopted specific regulations governing weighing and measuring devices used for wholesale sales of petroleum products, as well as other liquid products. These regulations supplement, and complement, weights and measures laws and regulations that are enforced at the State and local level covering other devices and commercial practices.

As a practical matter, these regulations cannot be actively enforced for every meter used in commercial transactions of petroleum products. Most weights and measures jurisdictions concentrate their resources on the retail sector and on wholesale transactions that occur in the local distribution of products to retail sellers. This focussed approach has the greatest effective impact in the marketplace.

For example, many weights and measures jurisdictions will examine motor-fuel dispensers (gas pumps) at the retail level, vehicle-tank meters (meters mounted on tank trucks) used for measurement of motor fuels and home heating oil at both wholesale and retail, and loading-rack meters, which meter the products delivered to the tank trucks, which in turn deliver it to gas stations, businesses, and homeowners.

It is the task of weights and measures officials to actively enforce these regulations, through such means as routine examinations of devices in commercial service and investigation of complaints regarding the equipment and/or practices of particular device users. In addition, weights and measures officials also perform the important function of providing guidance and information to the public, including consumers and sellers. The investment of effort in responding to requests for information and guidance is repaid both in terms of fewer complaints and violations and ultimately in a more fair and equitable marketplace.

The job of a weights and measures official is a challenging one, requiring knowledge, technical skills, judgment, and a high regard for safety. You must master the complexities of the specifications, tolerances, and procedures that have been established by your jurisdiction. You must be able to use precision test equipment expertly and safely. And you must perform your tasks judiciously, in such a manner as to assure the protection of the consuming public and at the same time minimize the burden of inspections and testing to the users of devices, since any cost incurred by the owner or operator of a device as the result of your activities will ultimately be passed on to consumers.

It is not enough simply to master technical procedures, as important as these are: you must also understand how the marketplace works. And it is not enough simply to learn specifications and tolerances; as you will learn in this course, you must also understand the design and operation of an entire metering system, of which the measuring device is only a part.

Finally, you must keep up-to-date with a constantly changing technology. As you are probably aware, the "high-tech" electronic revolution, which in recent years has extended to every sector of our economy, and has entered our homes and schools as well, has also had a major impact on the measurement industry. You must, therefore, be prepared to deal with frequent changes in already complex and highly sophisticated systems.

This training course is intended to help prepare you to perform these functions as they relate to a class of measuring devices used for the commercial measurement of petroleum products at the wholesale level. These devices, commonly known as "loading-rack meters," which are also used to measure liquid commodities other than petroleum products, will be described in detail in the next chapters.

You should also understand, however, that the purposes and objectives of this program are necessarily limited. It is not intended to train you as a mechanical or electronic technician, repairperson, or troubleshooter. Its primary purpose is to help you to perform the important job of a weights and measures official.

Upon completion of this training course, and the field training component that accompanies it, you should be able to:

- identify and describe the major types of loading-rack metering systems and their commercial applications;
- describe the operation of typical loading-rack metering systems and describe and identify their principal components, especially those involved in measuring, indicating, and recording deliveries of product;
- understand and describe safety issues, procedures, and equipment employed for field examinations of loading-rack metering systems;
- identify appropriate test equipment used for testing loading-rack metering systems in the field and describe procedures for setup, operation, reading, and maintenance of this equipment;
- describe procedures for inspecting loading-rack metering systems in the field to determine compliance with specifications and other requirements set forth in NIST Handbook 44 and outlined in the Examination Procedure Outline (EPO) recommended by the NCWM;
- describe procedures for testing loading-rack metering systems in the field to determine compliance with performance requirements set forth in Handbook 44 and the EPO recommended by the NCWM;
- describe post-examination tasks that must be performed upon completion of inspection and testing, including documentation and recordkeeping;
- perform examinations of loading-rack metering systems under direct and indirect supervision.

PREREQUISITES

No previous knowledge of loading-rack metering systems is required. However, before beginning the course you should be familiar with the organization of the specific laws and regulations that govern these devices in your jurisdiction.

You should also be familiar with the organization and use of NIST Handbook 44. If you lack this familiarity, it is recommended that before beginning the present course you complete Course 102 in this series, entitled "Introduction to NIST Handbook 44." This self-study course will provide you with the necessary background to undertake the study of specific devices, such as loading-rack meters.

SUMMARY

This training course is part of the National Training Program for Weights and Measures officials sponsored by the National Conference on Weights and Measures and NIST. It is intended to help prepare you to understand and enforce the laws and regulations of your jurisdiction relating to loading-rack metering systems used for wholesale sales of petroleum products. This is one of the important functions performed by weights and measures officials to ensure fairness and equity in the commercial marketplace. Before beginning this course, you should be familiar with the regulations of your jurisdiction regarding these devices, and with the organization of NIST Handbook 44. There are no other prerequisites.